Amendments to the Claims

Please amend the claims as shown below.

1. – 45. (Canceled)

46. (New) A method of controlling a sigma delta modulator with a loop which establishes a signal transfer function and a noise transfer function of the sigma delta modulator, wherein the sigma delta modulator receives an input signal and provides a modulated output signal in response to the input signal;

wherein the noise transfer function establishes a maximum stable amplitude for the input signal;

wherein the sigma-delta modulator comprises a loop filter and operates at a clock frequency that sets an over-sampling ratio;

the method controlling the sigma delta modulator to change the noise transfer function in response to an output signal of the modulator or a state variable of the loop filter, and comprising steps of:

processing the output signal of the modulator or a state variable of the loop filter with a peak detector to determine a peak detector output,

storing a running window of N previous samples of the peak detector output, where N is less than the oversampling ratio,

selecting a maximum of the N previous samples to provide an intermediate control signal,

deriving the control signals for controlling the noise transfer function from the intermediate control signal such that the noise transfer function is changed to suppress quantization noise to a smaller extent when the output signal of the modulator or a state variable of the loop filter represents a relatively large amplitude, whereas when the output signal of the modulator or a state variable of the loop filter represents a relatively small amplitude, the noise transfer function is changed to suppress quantization noise to a larger extent.

47. (New) The method according to claim 46, where the noise transfer function is changed while the sigma delta modulator operates in a stable state.

48. (New) The method according to claim 46, where the loop filter comprises a cascade of more than two integrators.

49. (New) The method according to claim 46, where shaping of the noise transfer function is controlled by changing filter coefficients of the loop filter to move zeroes or poles in the transfer function provided by the loop filter.

50. (New) The method according to claim 48, where the shaping of the noise transfer function is controlled by changing loss-coefficients of the more than two integrators of the cascade of more than two integrators.

51. (New) The method according to claim 50, where the loss-coefficients of the more than two integrators of the cascade of more than two integrators are controllably adjustable between a lower value larger than the value zero and an upper value lower than or equal to one.

52. (New) The method according to claim 46, where the loop of the sigma delta converter comprises a quantizer which quantizes an input to the quantizer in N_Q levels, where N_Q is larger than or equal to two levels, but less than six levels.

53. (New) The method according to claim 46, where the loop of the sigma delta converter comprises a quantizer, and where shaping of the noise transfer function is controlled by changing thresholds of a quantizer of the loop.

54. (New) The method according to claim 46, where the input signal is provided via a pre-filter which is controlled for selected values of the output signal of the modulator or a state variable of the loop filter.

55. (New) The method according to claim 46, comprising the step of:

computing connected values of threshold peak values and selectable loop filter parameters, which are connected in the sense that for a given value of the output signal of the modulator or the state variable of the loop filter, a nearest lower threshold peak value determines the threshold at which selectable loop filter parameters, when applied to the

loop filter, provide a modulator which is stable for values of the output signal of the modulator or the state variable of the loop filter.

56. (New) The method according to claim 46, wherein the peak detector performs low-pass filtering of the output signal of the modulator or the state variable of the loop filter and subsequently determines a numerical value of the low-pass filtered output signal of the modulator or the state variable of the loop filter.

57. (New) The method according to claim 54, wherein a decision on which control signals to provide for control of the noise transfer function is performed by a lookup table which comprises stored control signals and associated with values or ranges of values of the intermediate control signal.

58. (New) The method according to claim 57, wherein noise transfer functions which provide a maximum stable amplitude, MSA, located at least 5% above an estimated peak value are selected.

59. (New) The method according to claim 46, wherein a full-scale range of peak values of the output signal of the modulator or the state variable of the loop filter is divided into a number of ranges, where each range is associated with a selectable noise transfer function.

60. (New) The method according to claim 46, comprising the steps of determining:

minimum values of a noise amplification factor for different loop filters;

a maximum stable amplitude value, MSA, which is selected such that input signal values less than MSA will provide a stable modulator;

creating a bank of different loop filters wherein each loop filter is related to a respectively determined maximum stable amplitude value MSA; and

selecting a loop filter from the bank in response to the output signal of the modulator or the state variable of the loop filter.

61. (New) A sigma delta modulator with a loop which establishes a signal transfer function and a quantization noise transfer function of the sigma delta modulator, where the sigma delta modulator receives an input signal, x(n), and provides a modulated output signal, y(n) in response to the input signal;

wherein the noise transfer function establishes a maximum stable amplitude for the input signal;

wherein the sigma-delta modulator comprises a loop filter and operates at a clock frequency that sets an over-sampling ratio;

wherein the sigma delta modulator is configured to:

change the quantization noise transfer function, NTF, in response to an output signal of the modulator or a state variable of the loop filter,

process the output signal of the modulator or a state variable of the loop filter with a peak detector to determine a peak detector output,

store a running window of N previous samples of the peak detector output, where N is less than the oversampling ratio,

select a maximum of the N previous samples to provide an intermediate control signal, and

derive the control signals for controlling the noise transfer function from the intermediate control signal such that the noise transfer function is changed to suppress quantization noise to a smaller extent when the output signal of the modulator or a state variable of the loop filter represents a relatively large amplitude, whereas when the output signal of the modulator or a state variable of the loop filter represents a relatively small amplitude, the noise transfer function is changed to suppress quantization noise to a larger extent.

62. (New) The sigma delta modulator according to claim 61, where the noise transfer function, NTF, is changed while the sigma delta modulator operates in a stable state.

63. (New) The sigma delta modulator according to claim 61, where the loop filter comprises a cascade of more than two integrators.

64. (New) The sigma delta modulator according to claim 61, where shaping of the noise transfer function is controlled by changing filter coefficients of the loop filter to move zeroes or poles in the transfer function provided by the loop filter.

65. (New) The sigma delta modulator according to claim 61, where the loop filter comprises a cascade of integrator stages, and where shaping of the noise transfer function is controlled by changing loss-coefficients of the integrators.

66. (New) The sigma delta modulator according to claim 65, where the loss-coefficients of the integrators of the cascade of integrator stages are controllably adjustable between a lower value larger than the value zero and an upper value lower than or equal to one.

67. (New) The sigma delta modulator according to claim 61, where the loop of the sigma delta modulator comprises a quantizer which quantizes an input to the quantizer in N_Q levels, where N_Q is larger than or equal to two levels, but less than six levels.

68. (New) The sigma delta modulator according to claim 61, where the loop of the sigma delta modulator comprises a quantizer, and where shaping of the noise transfer function is controlled by changing thresholds of a quantizer of the loop.

69. (New) The sigma delta modulator according to claim 61, where the input signal is provided via a pre-filter which is controlled for selected values of the output signal of the modulator or the state variable of the loop filter.

70. (New) The sigma delta modulator according to claim 61, where the sigma delta modulator is configured to compute coexisting values of amplitude ranges, MSA, and loop filter parameters, which are coexisting in the sense that for a given value of an amplitude range, the coexisting loop filter parameters, when applied to shape the loop filter, provide a modulator which is stable for signal amplitudes smaller than the given value of an amplitude range.

71. (New) The sigma delta modulator according to claim 70, wherein the peak detector performs low-pass filtering of the output signal of the modulator or the state variable of the loop filter and subsequently determines the numerical value of the low-pass filtered output signal of the modulator or the state variable of the loop filter.

72. (New) The sigma delta modulator according to claim 61, wherein the decision on which of the control signals to provide for control of the noise transfer function is performed

by a lookup table which comprises stored control signals and associated with values or ranges of values of the intermediate control signal.

73. (New) The sigma delta modulator according to claim 61, wherein noise transfer functions which provide a maximum stable amplitude, MSA, located at least 5% above an estimated peak value are selected.

74. (New) The sigma delta modulator according to claim 61, wherein a full-scale range of peak values of the output signal of the modulator or the state variable of the loop filter is divided into a number of ranges, where each range is associated with a selectable noise transfer function.

75. (New) An analogue to digital converter comprising a sigma delta modulator according to claim 61.

76. (New) A digital to analogue converter comprising a sigma delta modulator according to claim 61.

77. (New) A microphone comprising a preamplifier and a sigma delta modulator according to claim 61.

78. (New) A class-D amplifier comprising a sigma delta modulator according to claim 61.